(No Model.) 2 Sheets—Sheet 1.

J. L. DOLSON.

BALL BEARING FOR VEHICLES.

No. 550,043. Patented Nov. 19, 1895.

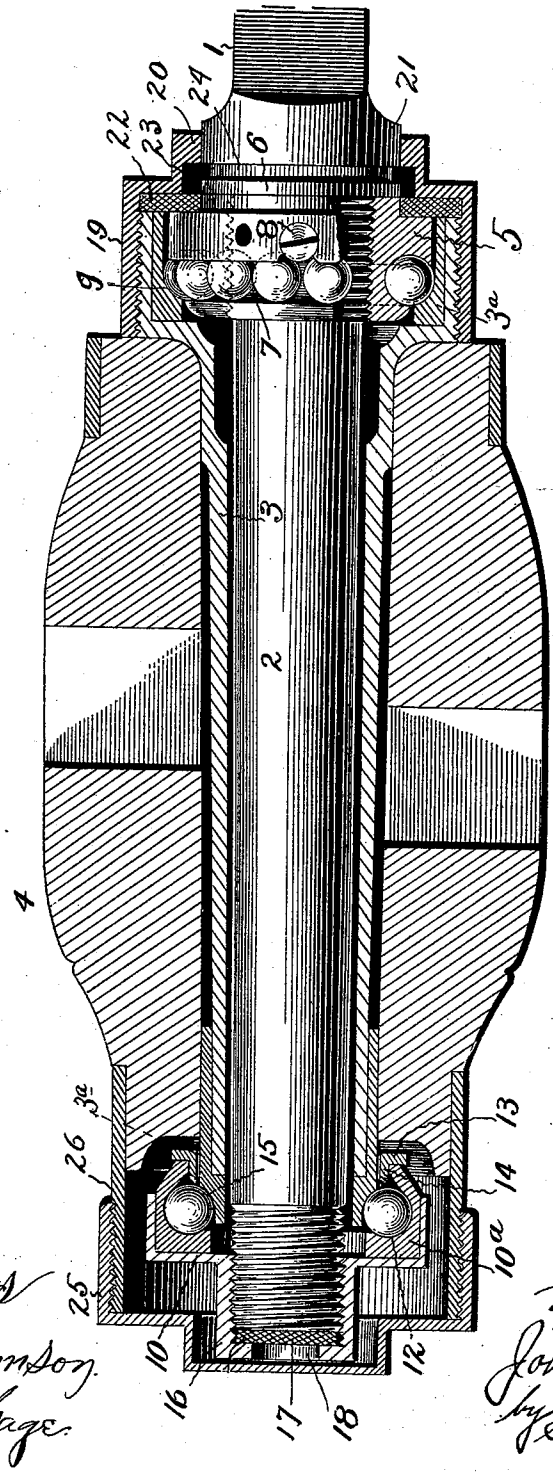

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

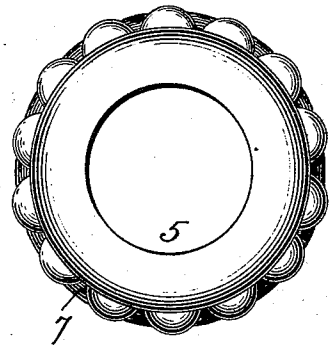


Fig. 3.

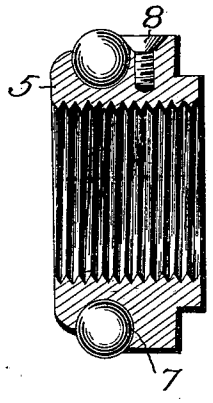


Fig. 4.

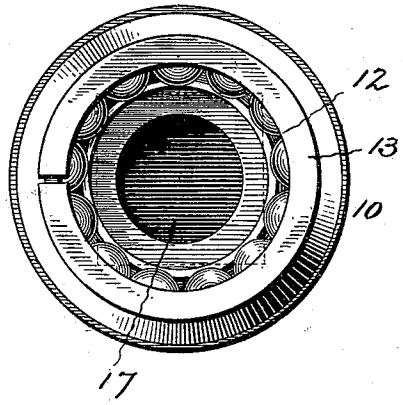
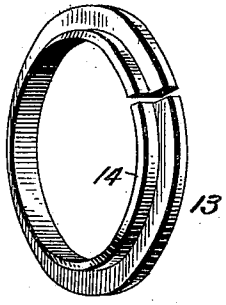


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN L. DOLSON, OF CHARLOTTE, MICHIGAN.

BALL-BEARING FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 550,043, dated November 19, 1895.

Application filed April 8, 1895. Serial No. 544,987. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. DOLSON, a citizen of the United States, residing at Charlotte, in the county of Eaton and State of Michigan, have invented certain new and useful Improvements in Ball-Bearings for Vehicles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to ball-bearings for wheeled vehicles; and it consists of certain novel features of construction and in the combinations and arrangements of parts hereinafter fully described in the following specification, and then more particularly pointed out in the appended claims.

To enable others to fully understand my invention, I will describe the same in detail, in connection with the accompanying drawings, in which—

Figure 1 is a central longitudinal section of an axle and box, in which my invention is incorporated, with parts broken away. Fig. 2 is a detail front view upon an enlarged scale showing the ball-bearing at the inner end of the axle-spindle. Fig. 3 is a detail vertical section through the same. Fig. 4 is a detail elevation of the ball-bearing nut, showing the confining-ring and the face of the washer; and Fig. 5 is a detail perspective of the split ring and flange used in the ball-bearing nut.

The reference-numeral 1 in said drawings indicates the axle, which is usually formed of iron, the spindle 2 being integral therewith. The end of the spindle is threaded to receive the ball-bearing nut, which is described hereinafter.

The numeral 3 denotes the axle-box, which is preferably formed of malleable iron in its middle portion, the exterior and interior ends of said box being provided with surfaces of hardened metal to afford a suitable bearing at each point for the balls. The wooden body 4 of the hub is mounted upon the box between the bearing extremities and is constructed in any well-known or preferred manner. These hardened portions at the extremities of the axle-box may be applied in any desired manner—for instance, as shown in the drawings, they may consist of steel portions 3^a pressed upon the exterior and into the interior ends of the iron box, so as to constitute the bearing-surfaces for the balls to press against.

The ball-bearing at the inner end of the spindle 2 consists of a single integral case of steel 5, made in annular form and screw-threaded on its interior surface, so as to screw upon a thread provided on the spindle adjacent to a collar 6 in such manner that it may be secured at the desired position on the spindle. The case 5 is provided with a channel 7 for the balls, so formed that its annular opening, which is of somewhat less width than the diameter of the balls lying in the channel, permits less than half of each ball to project beyond the outer face of the cone, the line of projection being inclined to the axis of the spindle at an angle somewhat less than ninety degrees on the side adjacent to the outer end of the spindle, thereby enabling the balls to sustain the direct weight of the vehicle as well as the end-thrust of the axle. The balls are admitted to the channel 7 by removing a screw 8, by which means the channel is sufficiently enlarged at one point to admit the balls one at a time, the restoration of the screw to its place completing the continuity of the channel 7 and confining the entire series of balls, which are free to travel or roll therein, a very slight play being allowed to prevent the adjacent balls from abrasion.

The inner hardened end of the axle box 3 is expanded in diameter to fit over the whole of the ball-bearing and it is provided with a shallow channel 9, which practically supplements the channel 7, as a circular bearing surface for the balls.

The ball-bearing at the outer end of the spindle consists of an annular cone or shell 10, into which there is pressed a steel or hard metal bearing-cup 10^a for the balls to bear upon. This cone or shell may be secured upon the threaded end of the spindle and form a nut to hold the hub in position. The cup 10^a is provided with a channel 12 for the balls, said channel opening toward the inner end of the spindle. The balls are confined in the channel when the nut is removed by a

ring 13, having a flange 14, which is pressed in the cup and fits closely against the outer edge of the ball-channel 12. The ring and its flange are split or divided, and being formed of steel the elasticity of the metal permits both parts to yield slightly to enable the flange to enter the ball-channel and the elastic expansion of the parts gives said flange sufficient frictional contact to enable it to retain its engagement. The inner edge of the ring 13 closely approaches the exterior periphery of the box 3, which enters within said ring, said box extremity being provided with a channel 15, which receives the exterior faces of the balls projecting from the channel 12. The line of strain exerted by the balls upon the end of the axle-box forms an angle of less than ninety degrees with the axis of the spindle, said angle opening toward the outer end of the latter. It is evident that by simply turning the nut upon the threaded end of the spindle any required compensation for wear or any required adjustment to give proper bearing for the balls without end play or rattling can easily be effected.

The ball-bearing nut or cone comprises an end portion or cap 16, which partially incloses the outer end of the spindle 2, and contains a washer 17, which abuts against or receives the end-thrust from the axle. The outer shell 10 and the cap 16 of this nut is made of malleable iron, but the cup containing the balls may be made of steel and pressed into the shell, as hereinbefore described. I may, however, make the entire nut of steel or hardened metal, the use of malleable iron being simply for purposes of economy in manufacture. The washer 17 is formed of leather or other suitable material and may be driven out of the end of the nut when the nut is removed from the spindle by inserting a punch in an opening 18, formed in the outer end of the cap 16.

The inner end of the box 3 is closed by a dust-cap 19, which screws upon the expanded end of the said box, as shown in Fig. 1 of the drawings. This cap is provided with a flange 20, which closely surrounds an enlarged portion 21 of the axle; but to effectually exclude the entrance of dust at this point I insert within the dust-cap a washer 22, of felt or other suitable material, which closely surrounds the axle, a recess or annular space 23 being provided to catch and retain any small quantity of dust or grit that may find its way in. As an additional safeguard, I provide a second annular space or channel 24 next the inner face of the collar 6, against which collar the ball-bearing cone bears when screwed into position. When the dust-cap is screwed to its place upon the expanded end of the box 3, the two recesses or annular spaces 23 and 24 are substantially in the same transverse plane and the felt washer 22 will substantially coincide with and lies against the inner ball-bearing cone. This felt-washer may, however, extend into the dust receiving spaces, if desired. A dust-cap 25 is screwed upon a threaded flange 26 upon the outer end of the hub to inclose the ball-bearing nut and the adjacent parts.

My invention presents the important advantage that I am able, without complicating the construction, to provide for the use of balls of large diameter which are capable of sustaining great weight and less susceptible to wear, and especially to irregular wear. I also provide extremely simple and effective means for compensating for the wear of the bearings and for taking up all end play to prevent noise and avoid constant blows upon the bearing-surfaces. By driving out the washer 17 in the cap 16 of the ball-bearing nut and filing said washer down the nut can be turned farther up upon the threaded end of the spindle, and thus the ball-bearing nut will be caused to take up any lost motion between the spindle and the axle-box. It should be noted, also, that the construction of the ball-bearing nut is not only economical as regards the use of hardened steel, but its simplicity and the ease with which it is manipulated, as well as the low price at which it could be manufactured, are all important factors in the commercial utilization of any type of ball-bearings.

Having described my invention and set forth its merits, what I claim, and desire to secure by Letters Patent, is—

1. In a ball bearing for wheeled vehicles, the combination of the spindle, the axle box mounted thereon and having an enlarged inner end, the ball bearing cone removably mounted on the inner end of the spindle and within the enlarged inner end of the axle box, the said cone having an annular groove formed therein concentric with the inner bearing face of the axle box, the said groove being substantially circular in cross section and the width of the opening of the said groove being less than the diameter of the same, the balls mounted in the said groove and projecting from the same and bearing against the inner face of the axle box, and the anti-friction mechanism interposed between the opposite end of the spindle and the axle box, substantially as described.

2. In a ball bearing for vehicles, the combination of the spindle, the axle box mounted thereon, the ball bearing cone removably mounted on the inner end of the spindle and having an annular groove formed therein concentric with the inner bearing face of the axle box, the said groove being substantially circular in cross section and the width of the opening of the said groove being less than the diameter of the same, the balls mounted in the said groove and projecting from the same and bearing against the inner face of the axle box, and the anti-friction mechanism inter-

posed between the opposite end of the spindle and the axle box, substantially as described.

3. In a ball bearing for wheeled vehicles, the combination with the spindle and axle box, of a ball carrying nut formed with a shell which partially incloses the end of the spindle, a series of balls within said nut, means removable with the nut for securing said balls against displacement, a cap formed at the outer end of said shell, and a removable washer in said cap, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN L. DOLSON.

Witnesses:
JOHN M. C. SMITH,
GEO. HUGGETT.